The Canadian Entomologist.

LXXVIII MAY, 1946 No. 5

GRACILLARIID STUDIES (GRACILLARIIDAE, LEPIDOPTERA)*

BY J. McDUNNOUGH
Ottawa, Ont.

As a result of breeding carried on in the course of Insect Faunal Survey work in the Maritime Provinces, combined with a study of genitalic characters, it has been found that the present application of names, especially in the *alnivorella* group and the so-called 'red-winged forms', is very faulty. More species, similar in general appearance but easily differentiated on male genital characters, have been found to occur than has been previously supposed; it is with a view of straightening out the nomenclature that the following notes have been prepared.

Gracillaria alnivorella Cham.

Gracilaria alnivorella Chambers, 1875, Cin. Quart. Jour. Sci., II, 199; Busck, 1904, Proc. U. S. Nat. Mus., XXVII 771; Ely, 1917, Proc. Ent. Soc. Wash., XIX, 49, 76; Forbes, 1924, Mem. 6, Corn. Univ. Agr. Exp. Sta., 172 (*partim*).

It has long been suspected that several species have been masquerading as forms of this alder-feeding species which has been correctly separated from its European relative, *elongella* Linn. It can now be stated definitely that the name *alnivorella* must be applied solely to the mottled gray and black (so-called 'pepper and salt form') species. Through the courtesy of the authorities of the Museum of Comparative Zoology, Cambridge, Mass., I have been enabled to make a slide of the genitalia of one of Chambers' type males; this proves conclusively that *alnivorella* is not only distinct from the European *elongella* but also from the reddish *alnicolella* Cham., listed as a form, and of which I have a slide of a type male before me.

The species is evidently very widespread; originally described from Colorado, it occurs commonly throughout eastern Ontario and extends into the Maritime provinces; from the far north we have a long bred series from Gt. Bear Lake, N.W.T. At Parrsboro, N. S., the larvae were very abundant on a species of alder with thick, fleshy leaves and very hairy underside which, following Victorin, I am calling *Alnus mollis*. They form a large, striking, tentiform habitation by bending over the lateral edge of the leaf; frequently, when the mid-rib forms the base of the fold, the two lateral edges of the leaf are brought together and the whole leaf thus becomes a kind of tent. Pupation takes place most generally in a small fold, inside the tent, at the edge of the leaf.

The male genitalia (fig. 1) are of the *populetorum* type as figured by Pierce (1935, Genit. Brit. Tin., Pl. LI), the ventral margin of the clasper being *distinctly angled midway*, followed by a gentle concavity of the apical portion; seen *in situ* from the ventral side, the two opposing margins are separated by a *heart-shaped space* below the apex and are not closely appressed. Both the long thin aedeagus and the vesica are *unarmed*, an excellent specific characteristic. The female genitalia are entirely membranous, the ductus bursae consisting of a very long, extremely thin tube, with initial and terminal half convolutions; the bursa is large, sack-like and contains the usual two hooked signa.

Gracillaria strictella Wlk.

Gelechia Strictella Walker, 1864, Cat. Lep. Het. Brit. Mus., XXIX, 591.
Gracilaria strictella Ely, 1917, Proc. Ent. Soc. Wash., XIX, 76.

I do not know who is responsible for the placement of *strictella* in *Gracillaria* but it seems to have been first listed in this genus in Dyar's Catalogue

*Contribution No. 2419, Division of Entomology, Science Service, Department of Agriculture, Ottawa.

B & Z Library

(1902); later Meyrick made *adaptella*—also described as a *Gelechia* and with page priority—a synonym, but this is hardly borne out by the description and needs verification; both names were based on material from St. Martin's Falls, Albany Riv., N. Ont., but the species appears to have remained unidentified by later workers.

In sorting over my material of *alnivorella* I came across a series of four males and three females from Ottawa and a single male from Gt. Bear Lake which differed markedly in genitalia from *alnivorella*, although superficially quite similar in forewing coloration and maculation. I am tentatively applying the name *strictella* to these specimens although verification by an examination of Walker's type material will be necessary before certainty can be assured. In general the forewings are somewhat deeper in color than those of *alnivorella* and the small dark dots on costa and along inner margin are lacking, these being replaced by small, quadrate patches of which an antemedian one on inner margin is largest; this tends at times to form an oblique band across wing by partial junction with a costal patch, there is also a tendency for white spotting to occur along the inner margin between the dark areas.

In the male genitalia (fig. 2) the clasper is rather similar in shape to that of *alnivorella* but the vinculum is enormously lengthened and narrowed; the aedeagus is long and thin and the vesica contains a single longitudinal row of short, stout spines, extending from base almost to apex. In the female genitalia the long ductus bursae is broader, especially in the distal half, than that of *alnivorella* and *well chitinized* for almost its entire length, the only membranous portion being a short twisted section just before entrance into the bursa.

Gracillaria alnicolella Cham.

Gracilaria alnicolella Chambers, 1875, Cin. Quart. Jour. Sci., II, 299; Busck, 1904, Proc. U. S. Nat. Mus., XXVII, 771; Ely, 1917, Proc. Ent. Soc. Wash., XIX, 76; Forbes, 1924, Mem. 68, Corn. Univ. Agr. Exp. Sta., 172 (*partim*).

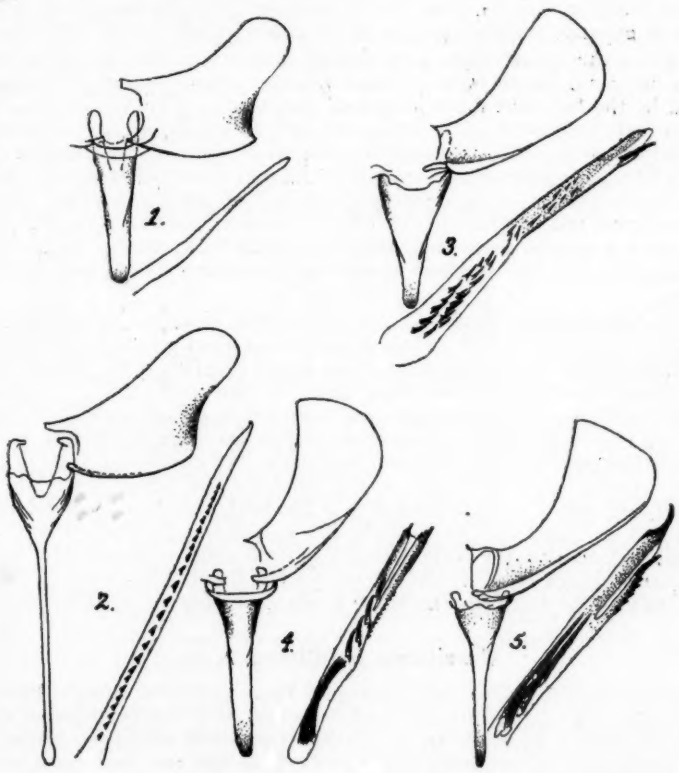
Both on forewing coloration and genitalic structure the species is abundantly distinctly from *alnivorella* of which it has generally been considered a mere color phase. *Alnicolella* as far as my limited material permits me to judge, is western in distribution and eastern specimens listed under this name must be separated from it. In genitalic structure it links up very closely with certain Vancouver Is. specimens which I had been holding under the name *sanguinella* Beut. but until Beutenmuller's types—now presumably in the U. S. National Museum—can be examined, the correct relationship of the names based on western material cannot be elucidated. For the present I confine myself to presenting a genitalic figure (fig. 3) from a male of Chambers' type lot in the Museum of Comparative Zoology, Cambridge, Mass. From this it will be seen that the shape of the clasper is essentially different from that of *alnicolella*, the ventral margin showing no projecting angle but being gently rounded. The aedeagus is long and thin, the slightly broader cephalic half being very finely membranous, the caudal half lightly chitinized, especially on the left side apically, and with better defined edges; there is a small subapical tooth on the left side; the vesica shows a *double longitudinal* row of *thin, pointed spines* which run from base to near apex, largest basally, gradually diminishing toward apex.

Gracillaria pulchella Cham.

Gracilaria pulchella Chambers, 1875, Can. Ent., VII, 146; Busck, 1904, Proc. U. S. Nat. Mus., XXVII, 771; Ely, 1917, Proc. Ent Soc. Wash., XIX, 76; Forbes, 1924, Mem. 68, Corn. Univ. Agr. Sta., 172 (*partim*).

For our eastern red-winged alder-feeder the only name at all applicable appears to be *pulchella* Cham., based on a specimen taken by Belanger in the Quebec City region and presumably, if existent, in the U. S. National Museum (Busck, 1903, Proc. U.S.N.M., XXV, 768). However in view of the fact that at least three distinct species with red wings occur commonly in eastern Canada the

correct application of Chambers' name is doubtful and until the genitalia of the type can be examined must remain so. From a careful study of the original description I rather incline to the idea that *pulchella* may prove to be the common *Prunus*-feeder for which the name *invariabilis* Braun has been proposed; however, as there seems little to be gained at the present time in upsetting the current usage of the names I continue to use the name, in the generally accepted sense, for the alder-feeding species.



Clasper, Vinculum and Aedeagus of 1. *Gracillaria alnivorella* Cham.; 2. *G. strictella* Wlk.; 3. *G. alnicolella* Cham. (Type ♂); 4 *G. pulchella* Cham.; 5. *G. betulivora* n. sp.

At Parrsboro, N. S., in both 1943 and 1944 the larvae were common on *Alnus incana*, rolling the leaves into a tight roll from the apex down (occasionally from the lateral edge); these rolls, quite distinct from the large tents of *alnivorella*, were not found on *A. mollis*. For pupation the larvae leave the rolls and spin smooth, pale yellow shiny cocoons in a fold of the leaf or along the edge of the breeding-tin. Apparently the larva occasionally feeds on birch as there is a single male before me bred from a roll on birch at Parrsboro in 1944.

Apart from specimens with a unicolorous brick-red forewing with a narrow yellowish shade along the costa which usually shows a series of small dark dots, we find others in which two dark dots or short streaks occur in the basal and midsections of the cell, followed usually by a dark shade extending from end of cell to near apex of wing. In all cases the ground-color remains brick-red with considerable purplish suffusion in certain lights.

The male genitalia (fig. 4) show considerable resemblance to those of the European *elongella* Linn., the type of clasper being essentially the same; however, the vinculum is much longer and thinner than that shown in Pierce's figure (1935, Gen. Brit. Tin., Pl. L). The aedeagus also shows the two lightly chitinized apical prongs feebly connected by a fine membrane, with one prong finely dentate along its margin; apart from the small basal cluster of long spines, present in both species, the vesica in *pulchella* shows a further row of four or five shorter but stouter spines which extend into the non-dentate apical fork; this fork terminates in a single, short, stout spine, rather of the rose-thorn variety; the other fork expands slightly apically and is either shortly tri- or bidentate.

From the superficially very similar *invariabilis* Brn. which is especially close to the unicolorous form of *pulchella,* the present species is readily distinguished by the fact that the aedeagus of *invariabilis* is drawn out into a single, long, strongly chitinized spine which can be easily observed without making a slide, projecting as it does between the ventral margins of the claspers.

The female genitalia seem close to Pierce's figure of *elongella,* the rather broad ductus bursae being strongly chitinized except for a short, shagreened, median section just beyond the exit of the ductus seminalis. The tube broadens distally and is somewhat twisted, the short bursa being similar in width to the terminal portion of the tube and appearing as a mere membranous continuation of same.

At Smith's Cove, Digby Co., N. S., in 1945, from the usual tight rolls on both *Betula populifolia* and *Betula papyrifera,* a good series of unicolorous red-winged species was bred along with about equal numbers of *G. coroniella* Clem., as determined by Busck (1903, Proc. Ent. Soc. Wash., V, 216). The cylinders were formed either by rolling the leaf from the apex downward or from the lateral edge inward and both species seemed to show similar habits; it must be confessed, however, that my observations were rather casual as I had not expected that two species were involved. As in *pulchella* the larvae leave the roll for pupation and spin a whitish cocoon in a leaf-fold. Until a genitalic study was made I had supposed that the unicolorous species was *pulchella* Clem. and was surprised to find that the males showed quite distinct characters in this organ, and appeared much closer to the *Myrica*-feeder, *flavella* Ely, than to the *Alnus*-feeder,, *pulchella.* I can find no name available so describe as follows.

Gracillaria betulivora n. sp.

Antennae pale, ringed with brown. Front yellow with slight brown shading laterally. Palpi, head, thorax and forewings deep brick-red, much the color of *pulchella* and *invariabilis*; in certain lights purplish reflections are noticeable on the forewings and certain of my type series exhibits the black spots in the cell and dark dots along costa and inner margin mentioned under *pulchella.* There is little trace of a yellow shade along the costa in the males but certain of the females are paler in color and show considerable yellowish suffusion in the costal area. Apical fringes of forewing concolorous; smoky along inner margin. Hindwings and abdomen deep smoky. Fore- and mid-coxae reddish; femora and tibiae purplish black with scanty red suffusion; hind legs dull grayish. Expanse 15 mm.

Male Genitalia. (fig. 5). Clasper and vinculum much as in *pulchella,* the vinculum being somewhat longer and narrower. The main distinction is found in the aedeagus and its armature; the two chitinized, terminal prongs are present as in *pulchella;* one showing a few small marginal teeth and terminating in a *single sharp spine;* the other prong is considerably longer and is drawn out into a *strong, curved, hook-like spine.* The basal cluster of spines (5-7 in number) is less appressed than in *pulchella,* the individual spines are longer and more scattered and there is *no subapical row of spines;* this character separates the species from *flavella* Ely, which shows a very similar type of apical armature.

Female Genitalia. Of the same general type as *pulchella* and its allies. Differs chiefly from *pulchella* in the shorter and apically broader chitinized portion of the ductus bursae; on the other hand the ductus is not nearly as short or broad as that of *flavella*.

Holotype — ♂, Smith's Cove, N. S., Aug. 12, 1945 (J. McDunnough) (bred from *Betula papyrifera*); No. 5655 in the Canadian National Collection, Ottawa.

Allotype — ♀, same data.

Paratypes — 7 ♂, 6 ♀, same data, Aug. 13-20, 4 ♂, 3 ♀, same locality, (bred from *B. populifolia*) Aug. 10-16.

A few specimens bred from birch at Parrsboro in 1943 and 1944 are also before me; a single female bred from a roll found on an apple leaf at Smith's Cove also appears to belong here.

A CANADIAN JAPYGID (THYSANURA)

BY L. G. SAUNDERS,
University of Saskatchewan, Saskatoon.

In 1941 Irvine Fox (Canad. Ent., 73:2) stated in an article on North American Japygidae that not a single species had been reported from Canada, and no subsequent record appears in the literature. It is therefore a privilege to be able to publish the first record of the occurrence of one of these interesting insects in Canada.

Every time I have been in British Columbia during the past twenty years, I have searched for japygids in leaf mould, under loose bark, and in similar moist places frequented by other Thysanura, but without success. In late August, 1944, I was visiting at Brentwood at the head of the Saanich Inlet on Vancouver Island and found them by accident in the most unlikely place. Having some leisure time I was desultorily culling fall dandelions from the completely parched lawn (it was a very dry summer) when something different from the usual run of small centipedes, millipedes and isopods was disclosed. A small hand lens was sufficient to reveal the characteristic terminal forceps of a japygid. Immediately excitement prompted the upturning of every other dandelion on the lawn, with the discovery of two more specimens.

The name fall dandelion is applied to two very similar genera, *Hypochaeris* and *Leontodon*,* and either or both may occur at Brentwood. The plant forms a rosette of leaves tight against the ground, from which long wiry peduncles arise. No grass can grow under the rosette, and it is on the bare dry earth underneath that the japygids occurred.

Japygids are extremely small and fragile, so it is not surprising that only one of three survived the violent method of exposure without injury. This one proved to have 30 antennal segments and with other characters enabled Miss Grace Glance of the Division of Insect Identification, Washington, to identify the species as *Evalliapyx sonoranus* Silvestri (1911) †. The species was described from Tucson, Arizona, so its dry habitat in British Columbia may not be as unusual as it seemed. It would be interesting to determine what other habitats it may have; I could find no specimens in debris under wild growth fringing the garden. At least this species has become emancipated from the "peach orchard soil" recorded as the habitat of every species described in Fox's paper.

*I am indebted to Mr. Cyril Berkeley of the Pacific Biological Station Nanaimo, for information on the fall dandelion: he has them in his own lawn.

†Reference: F. Silvestri (1911), Bol. Lab. Zool. Gen. e Agr. R. Scuola Super. di Agr. Portici, 5:75.

A REVISION OF THE SPECIES OF *SYMMERISTA* HÜBNER KNOWN TO OCCUR NORTH OF THE MEXICAN BORDER (LEPIDOPTERA, NOTODONTIDAE)

BY J. G. FRANCLEMONT,
Ithaca, New York.

During the first week of April, 1937, while on a collecting trip in central Florida, the writer found a larva of a notodont on oak; at the time of collecting the larva was referred to *Symmerista* with some doubt as it was unlike the northern specimens, being darker in color and with less contrast in pattern. This larva pupated at Ithaca and the moth, a normal *albifrons* female, emerged the end of May. Nothing more was thought of the matter until the writer began a general survey of the genitalia of the Notodontidae, preparing a series of genitalic slides of each American species. It was after discovering that the northeastern species of *Symmerista* was easily and readily divisble into three species on both male and female genitalia that the larva was thought to have some significance.

Unknown to the writer, Mr. Carl Heinrich of the United States National Museum was also at work on *Symmerista* and had decided that more than one species existed in the Eastern and Plains States. He had been led to a study of the genitalia by the finding of two types of larvae in the North; a type with three dorsal black lines in the last instar and a type with five dorsal black lines in the last instar. In 1941, Mr. Heinrich and the writer carried on a continuous correspondence on the subject, and in early 1942 during a visit to the United States National Museum, it was more or less decided that Mr. Heinrich would publish his views on the matter.

This spring after an interlude of four years, I again visited the United States National Museum, and Mr. Heinrich graciously referred his notes and drawings to me. While I have made good use of Mr. Heinrich's notes and drawings, any conclusions, erroneous or correct, regarding the limits of the various species to be discussed must be credited to the writer.

This paper is being published in advance of a general survey of the notodontids to make the new names employed available for use in the second section of "Lepidoptera of New York and Neighboring States," which will be forthcoming soon.

I wish to express my sincere thanks to Mr. Heinrich for his many kindnesses in the loan of notes, drawings and specimens and to the many people who have loaned me material for study.

Symmerista Hubner

1821 SYMMERISTA Hübner, Verz. bek. Schmett., 248 (Genotype: *Noctua albicosta* Hübner=*Phalaena albifrons* A. & S.=*Symmerista albifrons* (A. & S.), designated by Kirby, Syn. Cat. Lep. Het., i, 572, 1892)

1855 EDEMA Walker, List Lep. Het. B. M., v. 1028 (Genotype: *Phalaena albifrons* A. & S=*Edema albifrons* (A. & S.), designated by Kirby, Syn. Cat. Lep. Het., i, 573, 1892).

This genus may be characterized as follows: Head prominent; eyes naked; the palpi moderately long, closely scaled, obliquely porrect and exceeding front; proboscis much reduced; front clothed with erect scales; antennae of male narrowly pectinate, gradually narrowing to apex, which is simple; antennae of female simple; scape of antennae with a prominent fan-like plume on inner side, the dorsal scales of which are twice as long as the ventral scales, the plume reaching above middle of collar; head with a high ridge-like crest behind the antennal plumes; thorax clothed with long forked scales; abdomen clothed with long hair over flat scales in the male and with flat scales in the female, with a caudal tuft; fore wing with the costa straight, apex marked, the outer margin evenly rounded; accessory cell present, narrow; R_{2-5} stalked, R_5 beyond R_2, M_1 from apex of accessory cell or nearly so.

The larvae are smooth and shining with a contrasting pattern of narrow black lines and wide yellow to orange and blue to purple-brown stripes; the eighth abdominal segment has a red or reddish-brown hump.

The five species of this genus known to occur north of the Mexican border are hardly distinguishable superficially, though they have very different genitalia and the known larvae are different. The males of all species can be easily determined without mounting the genitalia by denuding the last sternite. The females can be less satisactorily determined by denuding the last abdominal sternite, but accurately determined by mounting the genitalia in any proven medium.

Symmerista suavis (Barnes)

Edema suavis Barnes, Can. Ent., xxxiii, 53, 1901
Symmerista suavis (Barnes), Schaus, Trans. Ent. Soc. Lond., 287, 1901
Symmerista albifrons var. *suavis* (Barnes), Dyar, Bull. U.S.N.M., lii (List N. Am. Lepid), 252, 1902
Symmerista (*Edema*) *suavis* (Barnes), B. & McD., Contrib. Nat. Hist. Lep. N. Am., i, part 4, 23, pl. 10, fig. 5, 1912
Symmerista albifrons race *suavis* (Barnes), B. & McD., Check List Lep. Boreal Am., 93, 1917
Symmerista albifrons form *suavis* (Barnes), Draut *in* Seitz, Macrolepid. World, vi, 942, 1932.
Symmerista albifrons var. *suavis* (Barnes), Gaede, Lepid. Cat., pars 59, 234, 1934
Symmerista albifrons race *suavis* (Barnes), McDunnough, Check List Lep. Can. U. S., part 1, 133, 1938

Superficially this species differs from the four following species in the white hind wings with infuscate margins and veins in the male and wider pectinate male antennae. The female is quite similar to the female of the following species, but the hind wings are usually whiter, having the appearance of white heavily powdered with fuscous with the exception of the base. The white costal mark in both sexes is usually heavily shaded with gray.

Male genitalia: Eighth sternite with a shallow emargination; tegumen with two ear-like processes, unlike any of the following species; ventral, basal process of aedoeagus bilobed and short; vesica armed with a few (6-12) stout conical cornuti.

Female genitalia: Anterior vaginal plate symmetrical, posterior margin usually slightly emarginate; posterior vaginal plate evenly rounded; ductus bursa with a chitinous ring at orifice; bursa with the upper third of ventral surface heavily chitinized and spiculate.

Larva: Unknown.

Distribution: Colorado (Durango, Glenwood Springs, Rio Blanco Mt.), Utah (Provo), Texas (Big Bend, Alpine, Kerrville), New Mexico (Ft. Wingate) and Arizona (Prescott, Hereford, Paradise. Palmerly, Huachuca Mts.). This species undoubtedly ranges south into Mexico.

Symmerista leucitys n. sp.

General color ash gray; head and collar yellow to yellow mixed with chestnut; thorax with central portion concolorous with collar; patagia and metathoracic tuft concolorous with wings; fore wing with the antemedial and postmedial lines double, dark with a light filling, lunulate, dentate on the veins; postmedial line far in, close to the reniform, not passing over the white costal patch, but ending at the tooth-like projection of that patch; subterminal line a series of oblique black dashes between the veins, in some specimens connected by finer black lines and thus forming a very undulate line; costa with a white stripe from antemedial line to apex, with a rounded tooth-like projection just beyond reniform and tapering to a point at apex, costal edge shaded with gray; hind wing and abdomen paler ash gray with a luteous cast.

Male genitalia: Eighth sternite with the emargination very deep and quite narrow; the socii large and sickle-shaped; the basal, ventral process of the aedoeagus short, stout and bilobed, no longer than the median dorsal process; the vesica armed with a number of short conical cornuti.

Female genitalia: Anterior vaginal plate symmetrical, evenly rounded in middle; posterior vaginal plate produced in middle, which is sharply but slightly notched; ductus bursa with a chitinous ring at orifice.

Larva: The colors bright and well marked, hump on eighth abdominal

segment orange red, three black dorsal lines in the last instar; recorded from maple on which the larvae are often quite numerous late in July and early in August in western New York State.

Distribution: From Maine to Minnesota through the northern tier of states and in Canada through southern Quebec and southern Ontario. This species appears to have the most limited distribution of the three species that range northward, being confined to the area delimited above.

Holotype: ♂, Ithaca, New York, 19 June 1941, J. G. Franclemont (United States National Museum Collection).

Allotype: ♀, Ithaca, New York, 18 June 1941, J. G. Franclemont (Franclemont Collection).

Paratypes: 83 (16 United States National Museum Collection, 21 Cornell University Collection, 3 Museum of Comparative Zoology Collection and 43 Franclemont Collection):

Ontario, Canada, Merivale — 1 ♂, J. J. deGryse
Orillia — 1 ♀, C. H. Curran
Quebec, Canada, Chelsea — 1 ♂
Meach Lake — 1 ♀
Minnesota, Itasca Park — 3 ♂♂, 2 ♀♀, L. W. Orr
Maine, Bangor & vicinity — 2 ♂♂, 1 ♀, F. A. Eddy
New York, Sardinia — 2 ♀♀, L. R. Rupert
Chaffee — 4 ♂♂, 5 ♀♀, J. G. Franclemont
Niagara — 1 ♂
Kendall — 1 ♂♂, H. S. Burnett
Ithaca — 32 ♂♂, 12 ♀♀, J. G. Franclemont and others
McLean Bogs Reserve, Tompkins Co. — 4 ♂♂, J. G. Franclemont and others
Green Co. — 1 ♂
Orient, Long Island — 1 ♂, 1 ♀, Roy Latham
Pennsylvania, New Brighton — 2 ♀♀, H. D. Merrick
H. G. Dyar No. 4875, List 10, 1890 — 1 ♂.

This species differs from the following three in its grayer color, lacking the warm red brown tints of those species, in the narrow emargination of the eighth sternite, in the large sickle-shaped socii and in the short bifid ventral process of the aedoeagus.

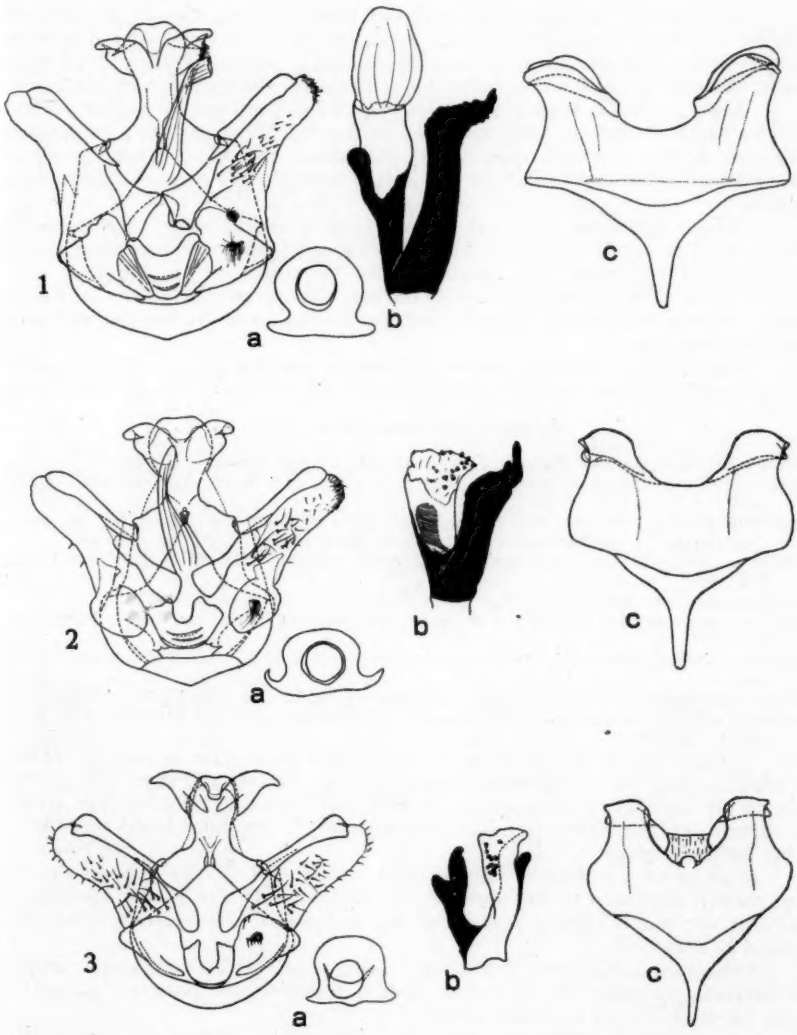
Symmerista albifrons (Abbot & Smith)

Phalaena albifrons Abbot & Smith, Nat. Hist. Lep. Ins. Georgia, ii, 159, pl. 80, 1797
Noctua albicosta Hübner, Samml. Eur. Schmett., (Noct) iv, pl. 93, fig. 400, 1808-(1809)*
Symmerista albicosa (Hbn.), Hübner, Verz. bek. Schmett., 248, 1821
Phalera albicosta (Hbn.), Herrich-Schaeffer, System. bearbeit, Schmett. Eur., ii, 128, fig. 131, 1845
Edema albifrons (A. & S.), Walker, List. Lep. Het. B. M., v, 1029, 1855
Symmerista albicosta (Hbn.), Walker, List Lep. Het. B. M., v, 1052, 1855
Edema albifrons (A. & S.), Morris, Syn. Lepid. N. Am., 242, 1862
Edema albifrons (A. & S.), Packard, Proc. Ent. Soc. Phil., iii, 358, 1864
Pygaera albicosta (Hbn.), Staudinger, Cat. Lep. Europ. Faun., 75, 1871†
Edema albifrons (A. & S.), Grote, New Check List N. Am. Moths, 19, 1882
Symmerista albicosta (Hbn.), Kirby, Syn. Cat. Lep. Het., 572, 1892 (*albicosta* designated type of *Symmerista*)
Edema albifrons (A. & S.), Kirby, Syn. Cat. Lep. Het, 573, 1892 (*albifrons* designated type of *Edema*)
Symmerista albifrons (A. & S.), Neum. & Dyar, Trans. Am. Ent. Soc. xxi, 187, 1894
Symmerista albifrons (A. & S.), Packard, Mem. Nat. Acad. Sc., vii, part 1 (Monograph of the Bombycine Moths of N. Am.), 179, pl. 4, fig. 14, 1895
Symmerista albifrons (A. & S.), Schaus, Trans. Ent. Soc. Lond., 287, 1901
Symmerista albifrons (A. & S.), Dyar, Bull. U.S.N.M., lii (List N. Am. Lepid.), 252, 1902

*The type was presumably from Georgia (Abbott). The figure appears to be of small specimen, possibly from material reared by Abbot.

†Staudinger state in a footnote "1) *Albicosta* Hbn. Noct. 440; HS 131 species est Americana".

PLATE VI



1. Male genitalia of *Symmerista canicosta* Franc., a. basal sclerite of aedoeagus, b. aedoeagus—ventro-lateral view, c. last sternite.
2. Male genitalia of *Symmerista albifrons* (A. & S.), a. basal sclerite of aedoeagus, b. aedoeagus — ventro-lateral view, c. last sternite.
3. Male genitalia of *Symmerista leucitys* Franc., a. basal sclerite of aedoeagus, b. aedoeagus — lateral view, c. last sternite.

Symmerista albifrons (A. & S.), B. & McD., Check List Lepid. Boreal Am., 93, 1917
Symmerista albifrons (A. & S.), Draudt *in* Seitz, Macrolepid. World, vi, 941, pl. 147, fig. C4, 1932
Symmerista albifrons (A. & S.), Gaede, Lepid. Cat., pars 59. 234, 1934
Symmerista albifrons (A. & S.), McDunnough, Check List Lepid. Can. U. S., part 1, 133, 1938

The pattern of this species is almost identical with that of the preceding species; the white tooth of the costal stripe is generally wider and deeper and often pointed; the narrow erect black reniform is surrounded by a red brown shade; the general color of the fore wing is browner; the hind wing is darker.

Male genitalia: Eighth sternite with a wide, deep emargination, which is of even width throughout, not narrowed in the middle as are the preceding and following species; the socii subquadrate and lobed; the basal, ventral process of the aedoeagus long and forked, its tip well beyond the tip of the median, dorsal process.

Female genitalia: Anterior vaginal plate asymmetrical, slightly swollen and inflated in middle; posterior vaginal plate much as in the preceding species; ductus bursa chitinized for approximately two-thirds of its length.

Larva: Colors subdued, usually darker ,five dorsal black lines in the last instar; the two middle lines (2 and 4) of the five lines usually broader and wavy; recorded from oak.

Distribution: Without doubt the widest ranging species of the group, being found from Nova Scotia to Florida and west to Illinois, Kansas and Texas.

Symmerista canicosta n. sp.

?*Edema albicosta* Grote (*nec* Hübner), New Check List, N. Am. Moths, 19, 1882
Symmerista albifrons var. *albicosta* Neum. & Dyar (*nec* Hübner), Trans. Am. Ent. Soc., xxi, 187, 1894
Symmerista albifrons var. *albicosta* Packard (*nec* Hübner), Mem. Nat. Acad. Sc., vii, part I (Monograph of the Bombycine Moths of N. Am.), 179, pl. 4, fig. 13, 1895
Symmerista albifrons var. *albicosta* Dyar (*nec* Hübner), Bull. U.S.N.M., lii (List N. Am. Lepid.), 252, 1902
Symmerista albifrons Holland (*nec* A. & S.), Moth Book, 296, pl. 39, fig. 7, 1903
Symmerista albifrons race *albiicosta* B. & McD. (*nec* Hübner), Check List Lepid. Boreal Am., 93, 1917
Symmerista albifrons form *albicosta* Draudt (*nec* Hübner) *in* Seitz, Macrolepid. World, vi, 941, 1932
Symmerista albifrons var *albicosta* Gaede, (*nec* Hübner), Lepid. Cat., pars 59. 234, 1934
Symmerista albifrons race *albicosta* McDunnough (*nec* Hübner), Check List Lepid. Can. U. S., part 1, 133, 1938

The pattern of this species is as in the other three aforementioned species: the white tooth of the costal stripe is usually acute, narrow and short; the general color of the fore wings is much as in *albifrons*, but the markings are crisper and there is less red brown suffusion and more black; the hind wings are slightly darker on the average.

Male genitalia: Eighth sternite very widely and deeply emarginate, the emargination narrowed in the middle; socii subquadrate and lobed, much as in *albifrons*; the basal, ventral process of the aedoeagus massive, not lobed, but widened at apex.

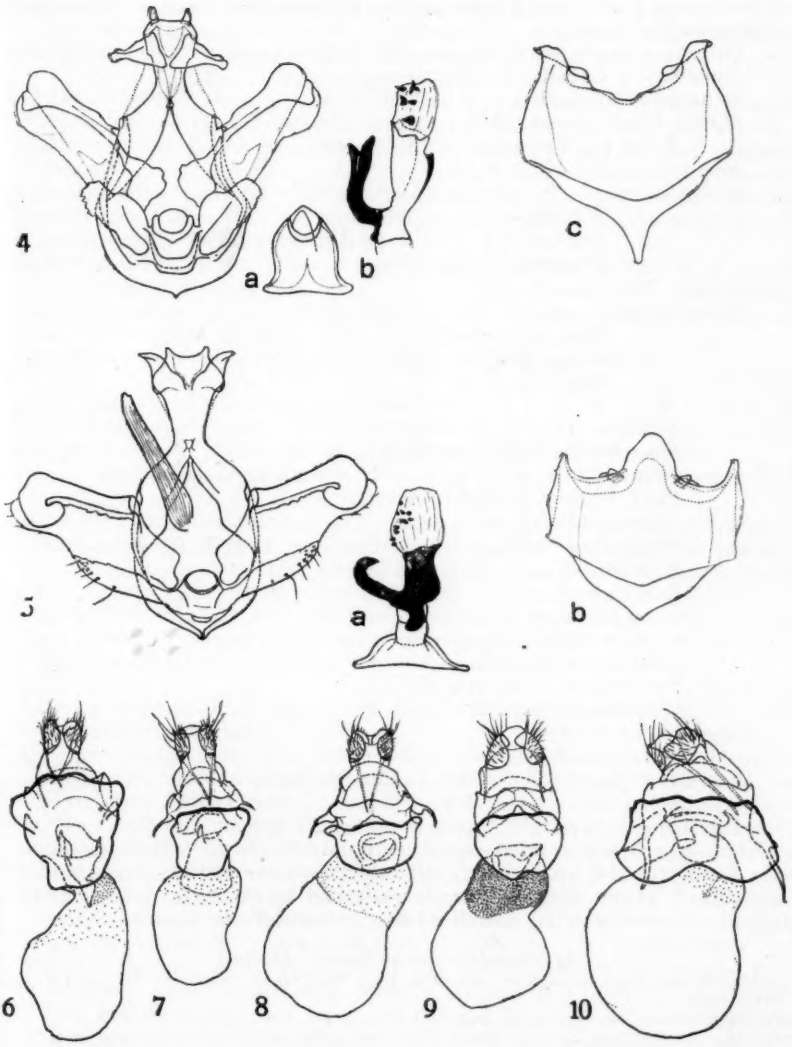
Female genitalia: Anterior vaginal plate symmetrical, very much swollen and inflated, especially in the middle, almost touching the posterior plate; the ductus bursa chitinized its entire length.

Larva: Like the preceding, with five black dorsal lines in the final instar; color sharp, light blue gray striate with black, with broad continuous deep yellow to orange subdorsal and lateral stripes, head orange and hump of eighth abdominal segment orange to orange red; recorded from oak, maple and rarely beech.

Distribution: Apparently more northern than the preceding, being found from Nova Scotia to Virginia, west to Manitoba in Canada and to Minnesota in the United States.

Holotype: ♂, New Brighton, Pennsylvania, 11 June 1903, H. D. Merrick (United States National Museum Collection).

PLATE VII



4. Male genitalia of *Symmerista suavis* (Barnes), a. basal sclerite of aedoeagus, b. aedoeagus — lateral view. c. last sternite.
5. Male genitalia of *Symmerista zacualpana* Drdt., a. aedoeagus with basal sclerite attached — ventral view, b. last sternite.
6. Female genitalia of *Symmerista canicosta* Franc.
7. Female genitalia of *Symmerista albifrons* (A. & S.)
8. Female genitalia of *Symmerista leucitys* Franc.
9. Female genitalia of *Symmerista suavis* (Barnes)
10. Female genitalia of *Symmerista zacualpana* Drdt.

(Figures 1-5 and parts thereof drawn to the same scale.)
(Figures 6-10 drawn to the same scale, approximately four-fifths the scale of Figures 1-5.)

Allotype: ♀, Ithaca, New York, 2 June 1941, J. G. Franclemont (Franclemont Collection).

Paratypes: 154 (47 United States National Museum Collection, 48 Cornell University Collection, 23 Museum of Comparative Zoology Collection, 36 Franclemont Collection.)

Ontario, Canada, Pt. Colborne—1 ♂, J. J. deGryse.
Nova Scotia, Canada, Baddeck, Cape Breton—5 ♂ ♂.
Minnesota, Itasca Park—3 ♂ ♂, L. W. Orr.
Maine, Kittery Point—2 ♀ ♀, Roland Thaxter.
Bangor & Vicinity—1 ♀, F. A. Eddy.
New Hampshire,— -1 ♀.
Massachusetts,— -1 ♀.
Weston—2 ♂ ♂, 4 ♀ ♀.
Newton—1 ♂, 2 ♀ ♀, Roland Thaxter.
Tynsboro—1 ♂.
Illinois, Decatur—3 ♂ ♂.
Pennsylvania,— -1 ♀.
New Brighton—5 ♂ ♂, 5 ♀ ♀, H. D. Merrick.
White Mills—1 ♂.
Pittsburg—1 ♂.
New York— -2 ♂ ♂.
Sardinia—1 ♂, L. R. Rupert.
Horseheads—5 ♀ ♀, L. R. Rupert.
Ithaca—31 ♂ ♂, 45 ♀ ♀, J. G. Franclemont and others.
Peru, Clinton Co.,—1 ♂.
Albany—1 ♂, 1 ♀.
Big Indian Valley, Catskill Mts.—1 ♂, 1 ♀, R. F. Pearsall.
Bear Mt.—2 ♀ ♀, H. J. Erb.
Brooklyn—1 ♂.
Long Island—1 ♂, 1 ♀.
Cypress Hills, Long Island— 1 ♂.
Richmond Hill, Long Island—1 ♂.
Woodhaven, Long Island—1 ♂.
Wyandanch, Long Island—1 ♀.
New Jersey,— - 1 ♂.
Elizabeth—1 ♀.
Virginia, Rosslyn—3 ♂ ♂, 4 ♀ ♀, Carl Heinrich.
Arlington—1 ♀, C. H. Popenoe.
Miscellaneous Accession Numbers—6 ♂ ♂, 2 ♀ ♀.

This species while quite similar to the others superficially, is distinguishable by the deeply and widely emarginate eighth sternite and the large undivided ventral process of the aedoeagus in the male and by the large inflated anterior vaginal plate and completely chitinized ductus bursa in the female.

Symmerista zacualpana Draudt

Symmerista albifrons form *zacualpana* Draudt *in* Seitz, Macrolepid. World, vi, 942, pl. 147, figs. D1&2, 1932

Symmerista albiifrons var. *zacualpana* Draudt, Gaede, Lepid. Cat., pars 59, 234, 1934

The general appearance is uniform ash gray, much like *leucitys*, but with a hint of the brownish shadings of *albifrons*. The pattern is as in the preceding four species; the lower edge of the white apical costal strip is defined by a sharp black line.

Male genitalia: Eighth sternite produced in the middle, thus contrasting with all the other species discussed here; socii not lobed; aedoeagus with a small deflected ventral process and with a large curved, lateral process.

Female genitalia: Anterior vaginal plate symmetrical, posterior margin bisinuate; posterior vaginal plate evenly rounded; ductus bursa chitinized for approximately one-fourth its length.

Larva: Unknown.

Distribution: Palmerlee, Arizona (2 ♂ ♂'s ex Barnes Collection now in the United States National Museum). I have seen this species from Zacualpan and Jalapa, Mexico, in addition to the United States locality recorded here.

The following keys will serve to differentiate the males and females of the five species known to occur in the United States and Canada.

Key to Species: Male

1. Last abdominal sternite with the caudal margin excavated on each outer third, the central third produced into a broad process; aedoeagus with a large, curved, lateral process and with a small, median, ventral, deflected process ..... *zacualpana* Drt.

   Last abdominal sternite with the caudal margin excavated in the middle; aedoeagus with a large or moderately large, single or bifid ventral process and a smaller dorsal process 2

2. Tegumen with two dorsal ear-like projections; the last sternite with central emargination shallow ..... *suavis* Barnes

   Tegumen without ear-like projections; the last sternite with the central emargination deep 3

3. Ventral process of aedoeagus large, single and with apex curved ..... *canicosta* Franc.

   Ventral process of aedoeagus with two lobes 4

4. Socii sickle-shaped, broad, not lobed ..... *leucitys* Franc.

   Socii subquadrate, lobed, with the upper lobe larger than the lower ..... *albifrons* A. & S.

Key to Species: Female

1. Bursa with the upper third of ventral surface heavily chitinized and spiculate; anterior vaginal plate symmetrical, not swollen, anterior and posterior margins emarginate; posterior vaginal plate evenly rounded ..... *suavis* Barnes

   Bursa without upper third of ventral surface chitinized and spiculate 2

2. Anterior vaginal plate much swollen and inflated, exceeding posterior margin of posterior vaginal plate and closing groove across body; ductus bursa moderately long and narrow, chitinized for its entire length ..... *canicosta* Franc.

   Anterior vaginal plate slightly or not swollen, groove wide across body; ductus bursa shorter 3

3. Anterior vaginal plate very broad, symmetrical, posterior margin bisinuate, emarginate in middle, anterior margin deeply emarginate; posterior vaginal plate more or less evenly rounded ..... *zacualpana* Drdt.

   Anterior vaginal plate narrow, posterior margin slightly emarginate in middle to rounded-out in middle, anterior margin not emarginate; posterior vaginal plate shallowly notched in middle 4

4. Anterior vaginal plate asymmetrical, slightly swollen in middle, posterior margin straight or slightly emarginate; ductus bursa moderately long and heavily chitinized for almost its entire length ..... *albifrons* A. & S.

   Anterior vaginal plate symmetrical, not swollen, posterior margin evenly produced and rounded-out in middle; ductus bursa short with a chitinous ring at orifice only ..... *leucitys* Franc.

The following list of species may be substituted for that now in McDunnough, "Check List of the Lepidoptera of Canada and the United States, Part 1", 133, 1938.

Symmerista Hubner
EDEMA Walker.
sauvis Barnes
leucitys Franc.
albifrons A. & S.
albicosta Hbn.
canicosta Franc.
albicosta Auct.
zacualpana Drdt.

NOTES ON SOME SPECIES OF *CANTHON* AND *DICHELONYX* (COLEOPTERA, SCARABAEIDAE) *

BY W. J. BROWN,
Ottawa, Ont.

Canthon imitator imitator n. sp.

This species is very common in Oklahoma and apparently in Texas. It restricts itself to areas of virtually pure sand where it replaces *Canthon laevis laevis* (Drury). It is very similar to *laevis*, the types of which came from New York and Maryland. Our New York and Pennsylvanian specimens of *laevis* are distinctly coppery over the entire dorsal surface and have the granules of the dorsum relatively close. Specimens from Illinois, Kansas, Oklahoma, and Alberta are similar and are typical *laevis* in every respect. Specimens from South Carolina and Florida show no coppery luster. They are either bright green above (subspecies *viridescens* Harold, 1868), or are black with, in some specimens, bluish or faint greenish reflections. They are less closely granulate above. Most of them agree with typical *laevis* in other characters, including those of the male copulatory organ and its internal sac, and appear to represent one or more races of that species. Some of the black specimens are more like *imitator* and are described below as *imitator floridanus* n. subsp. *C. imitator imitator* may be compared with *laevis* as follows.

Length 11.5 to 16 mm. Opaque, black, the color and luster as in the black southeastern form of *laevis;* the elytra of several teneral paratypes with a faint reddish cast. Clypeus less broadly and more deeply emarginate than in *laevis*. Angle formed by the bead of each lateral margin with the basal margin on the prothorax scarcely obtuse and not at all rounded; the bead forming a very obtuse, broadly rounded angle in *laevis*. Submedian angle of each lateral prothoracic margin virtually equidistant from the anterior and posterior prothoracic angles in *laevis*, distinctly more basad in *imitator*, the distance to the basal angle only three-fourths as great as the distance to the anterior angle in the latter. Granules of the pronotum and elytra sparser than in typical *laevis*, as in the southeastern forms of *laevis*. Anterior femora more elongate than in *laevis*. Anterior tibiae more deeply incised between the large teeth than in *laevis;* their inner margins feebly but distinctly curved opposite these teeth in *imitator*, straight in *laevis;* the anterior tibiae therefore feebly arcuate in *imitator* but straight in the other species. Anterior margin of each middle femur with a very fine, impressed line on the basal half in *imitator;* this line lacking in *laevis*. Middle and posterior tarsi equal in length in *imitator;* the posterior tarsi shorter in *laevis*, without the claws, from 85 to 90 per cent as long as the middle tarsi in the latter species. Male copulatory organ with the "toe" of the bootlike process of each lateral lobe somewhat variable but a little less strongly and less obliquely produced than in *laevis;* proximal portion of the internal sac with a ring and three other sclerites that are heavily sclerotized, these somewhat inconstant in form, similar to those of *laevis;* distal part of the internal sac with a densely spinose area, the coarser spines crowded together to form a banana-shaped mass that is about five times as long as wide in *laevis* and its races, but spread over a larger area that is about twice as long as wide in *imitator*.

Holotype: ♂, Perkins, Payne Co., Oklahoma, May 9, 1926 (W. J. Brown); No. 5551 in the Canadian National Collection.

Alllotype: ♀, Payne Co., Oklahoma, October 29, 1924 (W. J. Brown).

Paratypes: 5 ♀, 2 ♀, same data as holotype; 2 ♂, 1 ♀, same data as allotype; 1 ♂, Jackson Co., Okla., June 16, 1934 (E. Hixon); 1 ♂, Alfalfa Co., Okla., Aug. 17, 1932 (Pritchard & Deonier); 1 ♀, Okemah, Okla., July 18, 1937 (Standish & Kaiser); 1 ♀, Seiling, Okla., June 2, 1939 (Kaiser & Nailon); 2 ♂, 1 ♀, Tarrant Co., Tex., July 28, 1934 (J. H. Robinson); 1 ♀, Dimmit Co., Tex., April

*Contribution No. 2431, Division of Entomology, Science Service, Department of Agriculture, Ottawa.

21, 1933 (S. E. Jones); 1 ♀, Austwell, Tex., May 20, 1941 (W. Goodpastor); 1 ♀, Richmond, Tex., May 29, 1918 (J. Ch. Bradley); 1 ♂, Gillespie Co., Tex., May 2, 1935 (J. N. Knull); 1 ♂, Brazos Co., Tex., Sept. 19, 1934 (J. H. Robinson); 1 ♀, Texas.

Canthon imitator floridanus n. subsp.

Anterior tibiae with their inner margins not curved opposite the large teeth, these tibiae therefore straight as in *laevis*. Middle femora as in *laevis*, lacking an impressed line on their anterior margins. Posterior tarsi a trifle shorter than the middle tarsi, but relatively longer than in *laevis*. Male copulatory organ with the "toe" of the bootlike process of each lateral lobe as in *laevis*, the "toe" produced more strongly and more obliquely than in typical *imitator*. Other characters, including those of the internal sac, as in typical *imitator*.

Holotype: ♂, Gainesville, Alachua Co., Florida (F. W. Walker); in the collection of O. L. Cartwright.

Allotype: ♀, same data.

Paratypes: 1 ♂, 3 ♀, same data.

The green and black forms of *laevis* which are mentioned above also occur at Gainesville. A field study designed to show the relationship of these to one another and to *floridanus* should give interesting results.

Dichelonyx Harris

It appears that *Dichelonyx testacea* (Kby.) has been misidentified and that the name applies properly to one of the two forms which have been confused under the preoccupied name *elongata* (Fab.).

The specimens identified in collections as *elongata* show great variation in color and in the vestiture of the pronotum of the females. Specimens taken together show such variation and frequently do not match well series from other localities. However, the series are separable into two groups which appear to represent forms of specific or subspecific rank. One of these occurs on and very near the Atlantic Coast and has the pronotum in both sexes less closely punctate than in the other form, which occurs in inland regions. The pronotal sculpture varies in both forms, but not enough to prevent the placing of specimens. The two do not differ in characters of the male copulatory organ and its internal sac. The names that have been applied are as follows.

Melolontha elongata Fab. The name is preoccupied by the usage of Olivier. The pronotum is not described and no type locality is given. Because of its early date, it seems probable that the name was applied to the coastal form. The redescription by Burmeister is probably based in part on *subvittata* (Lec.). Both the coastal and inland forms are included under the *elongata* label in the collections of LeConte and Fall, and their writings suggest that they confused the two. The redescriptions of Horn and Blatchley apply only to the inland form. Saylor's description applies to both forms.

Melolontha elongatula Schon. This was validated as a new name for *elongata* Fab. It is applied in these notes to the coastal form.

Melolontha linearis Gyll. The pronotum is described as finely and obsoletely punctate, and the type locality is given as North America. The species was recognized as valid by Burmeister and LeConte, who identified it as the inland form. Horn placed the name as a synonym of *elongata*, which he identified as the inland form, and his synonymy has been followed by subsequent authors. Following this usage, the name *linearis* is applied to the inland form in these notes.

Melolontha hexagona Germ. The pronotal punctation is not described. The type locality is given as Kentucky, and because of this the name is synonymized below with *linearis*.

Dichelonycha virescens Kby. The pronotal punctation is not described. The types were taken in Canada by Dr. Bigsby and in Massachusetts, Pennsylvania, and Nova Scotia. The localities suggest that Kirby had both forms, and his "variety C" of *virescens* is surely *subvittata* (Lec).

Dichelonycha testacea Kby. The type was taken "by Dr. Bigsby in Canada" and is described as: entirely rufo-testaceous; with the head, prothorax, and tarsi a little darker; with the elytra slightly tinted with green; and with the head and prothorax, especially the latter, more thickly and minutely punctured than in *subvittata* ("variety C" of *virescens*). The only specimens that satisfy this description are the palest ones of *linearis*, the inland form of *elongata* auct. In *testacea* auct., nec Kirby, the pronotal punctation is similar to that of *subvittata*, and the clypeus is much more broadly reflexed, a character appreciated by Kirby. Moreover, *testacea* auct. is a species of the prairies, and Bigsby traveled only as far west as the Lake of the Woods (see Bigsby, John J., The Shoe and Canoe, 2 vols., London, 1850). Most and possibly all of Bigsby's collecting was done in the regions of Lake Huron and Lake St. Clair, where *linearis* is very abundant. *D. testacea* auct. is described below as *kirbyi* n. sp.

Dichelonyx elongatula (Schön.)

Melolontha elongata Fabricius, 1792, Ent. Syst., I (2), 170 (nec Olivier, 1789, Ento., I, no. 5, p. 23, pl. 4, fig. 31); 1801 Syst. Eleuth., II, 174.
Melolontha elongatula Schonherr, 1817, Syn. Insect., I (3), 210.
Dichelonycha virescens Kirby, 1837, *in* Richardson, Fauna Boreali-Americana, IV, 134 (partim).
Dichelonycha elongata (Fab.). Burmeister, 1855, Handbuch Entom., IV (2), 74 (partim); LeConte, 1856, Jour. Acad. Nat. Sci. Philadelphia, 3:279 (partim); Fall, 1901, Trans. Am. Ent. Soc., 27:282 (partim).
Dichelonyx elongata (Fab.). Leng, 1920, Cat. Coleop. N. A., 257 (partim); Saylor, 1946, Bull. Brooklyn Ent. Soc., 60:148 (partim).

As in *linearis*, the body varies from reddish to dark brown and the elytra from pale to deep green or purple. However, pale individuals with feebly metallic elytra are not numerous in the series. As in *linearis*, the pronotal punctation is somewhat variable and is closer in some females than in males. A few of the females have the pronotal hairs thickened as in many of *linearis*, but the hairs are never dense enough to conceal the surface. The species is represented in the collection by specimens from the following localities.

New Brunswick: Fredericton.
Maine: Wales, Paris, Monmouth.
Massachusetts: Framingham, Natick, Sherborn, Auburndale, West Springfield.
New York: New Rochelle.
Pennsylvania: Delaware Co., Angora.

Dichelonyx linearis n. sp.

Melolontha linearis Gyllenhal, 1817, Syn. Insect., I (3), 103 of supplement
Melolontha hexagona Germar, 1824, Insect. Sp. Novae, 124.
Dichelonyx linearis (Gyll.). Harris, 1826, Mass. Agr. Repos., 10:6 (not seen); Leng, 1918, Jour. New York Ent. Soc., 26:207.
Dichelonycha virescens Kirby, 1837, *in* Richardson, Fauna Boreali-Americana, IV, 134 (partim).
Dichelonycha testacea Kirby, 1837, *in* Richardson, Fauna Boreali- Americana, IV, 135 (*new synonymy*).
Dichelonycha elongata (Fab.). LeConte, 1856, Jour. Acad. Nat. Sci. Philadelphia, 3:279 (partim); Horn, 1876, Trans. Am. Ent. Soc., 5:187; Fall, 1901, Trans. Am. Ent. Soc., 27:282 (partim); Blatchley, 1910, Coleop. Ind., 952.
Dichelonycha linearis (Gyll.). Burmeister, 1855, Handbuch Entom., IV (2), 74; LeConte, 1856, Jour. Acad. Nat. Sci. Philadelphia, 3:279.
Dichelonyx elongata (Fab.). Leng, 1920, Cat. Coleop. N. A., 275 (partim); Saylor, 1946, Bull. Brooklyn Ent. Soc., 60:148 (partim).

As recognized here, *linearis* is either a complex of cryptic species or a single, extremely variable species that tends to form local races. The body varies from pale reddish to dark brown, and the elytra show green or purple reflections that are nearly always distinct. There is dimorphism in the pronotum of the females. In some the pronotal vestiture is fine and rather sparse, the sculpture and vestiture being as in the males except that the punctures are more dense. In other females, the pronotal surface is virtually concealed by coarse, dense hairs. All females from southernmost Quebec (Knowlton District) and nearly all from the

Ottawa District are of the latter type, as are all of a short series from Davis, Okla. All females, seven, from Walsingham, Ont., have the vestiture like that of the males, but others taken near Lake Erie have the dense type. Females from Georgian Bay and from Rocky Bottom, S. C., show both types, sparsely haired individuals being scarce in the former but abundant in the latter series. Specimens with dark bodies and strongly metallic elytra are more numerous in the Knowlton and Rocky Bottom series than in the series from Ontario.

Dichelonyx linearis is represented in the collection by material from the following localities.

Quebec: Knowlton District, Covey Hill, Ottawa District.

Ontario: Honey Harbor, Miners Bay, Leamington, Pt. Pelee, Walsingham, Toronto, Bothwell, Smoky Falls (Mattagami River), Sudbury, Ottawa District.

New York: Cooks Falls.

Pennsylvania: Mt. Alto, Horse Valley, Caledonia, Inglenook (Dauphin Co.).

North Carolina: Cataloochee Divide.

South Carolina: Rocky Bottom, Pinnacle Mountain.

Georgia: Rabun Bald.

Illinois: Libertyville.

Oklahoma: Davis.

Dichelonyx kirbyi n. sp.

Dichelonycha testacea Kirby. Leconte, 1856, Jour. Acad. Nat. Sci. Philadelphia, 3:279; Horn, 1876, Trans. Am. Ent. Soc., 5:188; Fall, 1901, Trans. Am. Ent. Soc., 27:284.

Dichelonyx testacea (Kby.). Leng, 1920, Cat. Coleop. N. A., 258; Saylor, 1946, Bull. Brooklyn Ent. Soc., 60:148.

The most striking character of this species is the virtually uniform, pale brownish-yellow color, the metallic reflections of the elytra being feeble or obsolete. In these respects *kirbyi* resembles the palest, least metallic individuals of *subvittata, elongatula,* and *linearis.* Such individuals of *subvittata* are best distinguished by the feebly reflexed clypeal margin of the latter, as the pronotal punctation is identical in the two species. Other species are compared with *kirbyi* in the following table. Length of *kirbyi,* 8 to 10 mm.

Holotype: ♂, Attons Lake, Cut Knife, Sask., June 9, 1940 (A. R. Brooks); No. 5612 in the Canadian National Collection.

Allotype: ♀, same data.

Paratypes: 5 ♂, 2 ♀, same locality and collector, May 30, June 9 and 10, 1940; 4 ♂, 4 ♀, Christopher Lake, Sask., July 3, 1939 (A. R. Brooks); 3 ♀, Lethbridge, Alta., June 19, July 3 and 8, 1929 (J. H. Pepper); 1 ♂, Sandilands, Man., July 14, 1930 (N. Criddle).

I have seen other specimens from Aweme, Cartwright, and Victoria Beach, Man., Pakowski, Alta., Lincoln, Nebr., and from Montana. The species is evidently restricted to the prairies, although the LeConte collection contains two specimens bearing Lake Superior labels. Horn, Fall and Saylor have recorded specimens from Vermont, probably in error.

The following table considers the ten species of *Dichelonyx* that occur east of the Rocky Mountains. Many of the records of distribution in the United States are taken from the literature.

Clypeus right-angled on each side in the male; the clypeal angles slightly obtuse but not broadly rounded in the female. Pronotum very finely scabrous, lacking discrete punctures. Color extremely variable. Longer spur of hind tibia of the male narrowed to an acute apex like the shorter spur. Mont. and Nebr., So. Calif., and Ariz. ..... *truncata* (Lec.)

Clypeus broadly rounded on each side. Pronotum punctate, the punctures at middle sometimes dense but discrete except in some females of *linearis* ..... 1.

1. Pronotum with a well-defined median sulcus. Elytra green; with narrow, feebly elevated costae which are much less pubescent and punctate

than the adjacent parts. Larger spur of hind tibia of male twisted, subparallel, truncate, about four times as wide as the smaller spur. N. S. to Ont.; N. C. to Ind. and Mich. ..... *albicollis* (Burm.)

Pronotum very feebly or not at all sulcate. Elytral vestiture uniformly distributed. Larger spur of hind tibia of male straight, much narrower..... 2.

2. Clypeal apex very narrowly reflexed; clypeal suture often distinct but never impressed ..... 3.

Clypeal apex more broadly reflexed, the reflexed margin as wide as the terminal segment of the maxillary palpus. Legs, when pale, never with the posterior tibiae darkened apically except rarely in *fuscula*. Pronotum never densely punctate or concealed by the vestiture. ..... 5.

3. Clypeus paler than the front except in examples that are entirely reddish-yellow. Pronotum reddish-yellow, at least broadly so on the sides and at base; closely but not densely punctate. Elytra yellowish, usually with greenish or purplish reflections; usually with the humeral and apical umbones, or with a vitta extending on each between these umbones, dark and strongly metallic. Legs entirely pale. Larger spur of hind tibia of male parallel or slightly widened apically, broadly rounded at tip. N. S. to Man.; N. C. to Ind. and Minn. ..... *subvittata* (Lec.)

Clypeus, except for the reflexed margin, not paler than the front. Pronotum reddish, or blackish with at most the sides obscurely pale. Elytra more uniform in color, the umbones occasionally a trifle darker than the disk. Legs pale, the posterior tibiae always darkened apically except in some specimens with the body entirely reddish. Larger spur of hind tibia of male narrowed apically and pointed much like the smaller spur ..... 4.

4. Pronotum very closely punctate; the punctures at middle usually more or less confluent; males and some females with the punctures dense or confluent over a large area before each posterior angle, these individuals with the hairs sparse and fine; some females with the pronotal punctures confluent throughout, the surface then dull and usually entirely concealed by a mat of coarse, dense hairs. Body varying from pale reddish to dark brown as in the following species; pale individuals abundant. Inland localities; Ont. and Que. to Ga. and Okla. ..... *linearis* (Gyll.)

Pronotum less closely punctate; the punctures never confluent except sometimes on a very small area near each posterior angle. Pronotal hairs fine and sparse in males and some females; coarse and closer in some females, but never concealing the surface which is never opaque. Pale individuals scarce. Localities on or near the coast; N. B. to Penn. ..... *elongatula* (Schon.)

5. Elytra deep bronze or blackish, never with greenish reflections, usually with the lateral and apical margins pale. Body either red, with the legs yellow or blackish, with the legs dark brown or bicolored. Clypeal suture impressed. Larger spur of hind tibia of male parallel, its apex rounded. Penn. to Ga. and Mo. ..... *fuscula* (Lec.)

Elytra deep, bright green or blue-green, not at all yellow except for the pale lateral and apical margins in *canadensis*. Clypeal suture not impressed. Larger spur of hind tibia of male narrowed and pointed apically ... 6.

Elytra pale brownish-yellow; purplish reflections sometimes very distinct but never concealing entirely the yellowish color. Legs entirely yellow; the large spur of the hind tibia of the male parallel, its apex rounded ..... 7.

6. Body entirely blackish. Legs dark brown or blackish. Que. to B. C. ..... *backii* (Kby.)

Body reddish-brown; head and pronotum darker, but the clypeus largely or entirely, and the pronotal sides usually, yellow. Legs entirely yellow,

the upper tooth of the anterior tibia sometimes reduced of lacking. Me., Que., Ont. ..... *canadensis* (Horn)

7. The entire insect pale brownish-yellow; elytra usually with feeble greenish or purplish reflections in certain lights, these rarely distinct. Clypeus a little less broadly truncate, its suture not impressed. Head and pronotum more closely punctate; the transverse, subapical sulcus of the latter less deep and nearer the anterior margin. Man to Alta. and Nebr. ..... *kirbyi* n. sp.

Pale brownish yellow; the front and pronotum, in part at least, brown or blackish; the thorax beneath often brown; elytra usually with greenish or purplish reflections, these sometimes strong. Clypeal suture impressed. N. S. to Que., Ind., and N. C. ..... *diluta* (Fall)

NOTES ON ROBINIA-FEEDING PHYCITID LARVAE (LEPIDOPTERA, PHYCITINAE) *

BY J. McDUNNOUGH,
Ottawa, Ont.

In the Phycitid genus *Salebria* Zell. the name *subcaesiella* Clem. with synonym *contatella* Grt. has been listed in our current check lists as a variety of *virgatella* Clem. with synonym *quinquepunctella* Grt.

I have no means at present of checking on the correctness of the application of Clemens' names as above listed and this matter will have to rest until such time as the types at Philadelphia (if still existent) can be carefully examined. However breeding experiments carried out at Smith's Cove, N. S., during the summer of 1945 established the fact that there were two types of *Salebria* larvae feeding on *Robinia*; in the one case the pale greenish larva possessed all extremely shiny black head and prothoracic shield, in the other, with very similar abdominal maculation, the head was pale brownish with the prothoracic shield pale-colored, similar to the color of the abdomen. From the black-headed larvae, which were extremely common, a good series of undoubted *contatella* Grt., as figured by Grote and also Ragonot (Mon. Phyc., Pl. XXII, fig. 23), was secured, thus proving the correctness of Beutenmuller's larval notes (1890, Can. Ent. 16). The much rarer pale-headed larvae, on the other hand, produced nothing but *quinquepunctella* Grt. (*vide* Ragonot's figure, *op. cit.* Pl. XXII, fig. 24). It seems probable that Comstock's larval description under the name *contatella* (Agr. Rep. for 1880, 261) was based on similar larvae and should therefore be transferred to *quinquepunctella*.

Surmising that two good species were involved, as originally claimed by Grote, genitalic slides of the males were made. Specific distinctness was definitely established and among other things good differential characters were found in the armature of the aedeagus. In the one case, *quinquepunctella* Grt., the aedeagus is armed with two, moderately large cornuti, placed one behind the other; in the other case, *contatella* Grt., there is only a single, somewhat larger, cornutus.

It might further be noted that none of the *quinquepunctella* pupae emerged until the spring of 1946, passing the winter in a pupal state. Fully half of the *contatella* pupae, however, emerged in September, 1945, the balance carrying over until 1946. Throughout August at Smith's Cove all sizes of *contatella* larvae could be found, varying from freshly hatched to almost full grown ones. When ready for pupation the larva turns dull pink and spins a tough cocoon among debris at the bottom of the breeding tin.

---

*Contribution No. 2429, Division of Entomology, Science Service, Department of Agriculture, Ottawa.

Some Observations on the Effect of a 5% DDT Dust on Bees

Comparatively little is known concerning the effects of DDT as it affects solitary bees and bumblebees. In order to try to obtain some information on this subject, specimens of bumblebees, honeybees and solitary bees were collected from apple blossoms and placed in cages. There was no attempt made to maintain cultures of the same species, and in some instances both honeybees and solitary bees were kept in the same cage.

The bees to be tested were dusted lightly through the screen covering the top of the cage. Then all lots were provided a 1-1 sugar syrup. The cages were kept at room temperatures during the tests.

TEST NO. 1

Time	Solitary bees No. dead	Bumble bees No. dead	Check No. dead
6 hrs.	0	0	0
18 "	8	0	0
24 "	10 (all)	1	0
36 "	—	5 (all)	0
48 "	—	—	0

TEST NO. 2

Time	Solitary bees No. dead	Bumble bees No. dead	Honeybees No. dead	Check No. dead
6 hrs.	0	0	0	0
18 "	7	0	6	0
24 "	10 (all)	1	10 (all)	0
36 "	—	3	—	0
48 "	—	5	—	0
60 "	—	10 (all)	—	0

It is realized that the number of insects is too few to make any definite conclusions and it is also recognized that laboratory tests and field tests do not always agree. However, in view of the consistently similar results, it would seem that both solitary bees and honeybees exposed to dusts as they pollinate agricultural crops may be poisoned. Definite symptoms of lack of coordination developed in several instances within 10 to 15 minutes following the application of the dust.

On a comparative basis it would seem that in the tests conducted, the honeybees and solitary bees were about equally affected. The bumblebees were apparently more resistant to the application.

F. R. SHAW
Massachusetts State College.

GUELPH PRINTING SERVICE

Mailed Friday, November 1, 1946.